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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04N 7/15 — A1

(11) International Publication Number: WO 99/59337

(43) International Publication Date: 18 November 1999 (18.11.99)

(21) International Application Number: PCT/US99/10414

(22) International Filing Date: 12 May 1999 (12.05.99)

(30) Priority Data:
09/076,201 12 May 1998 (12.05.98) US

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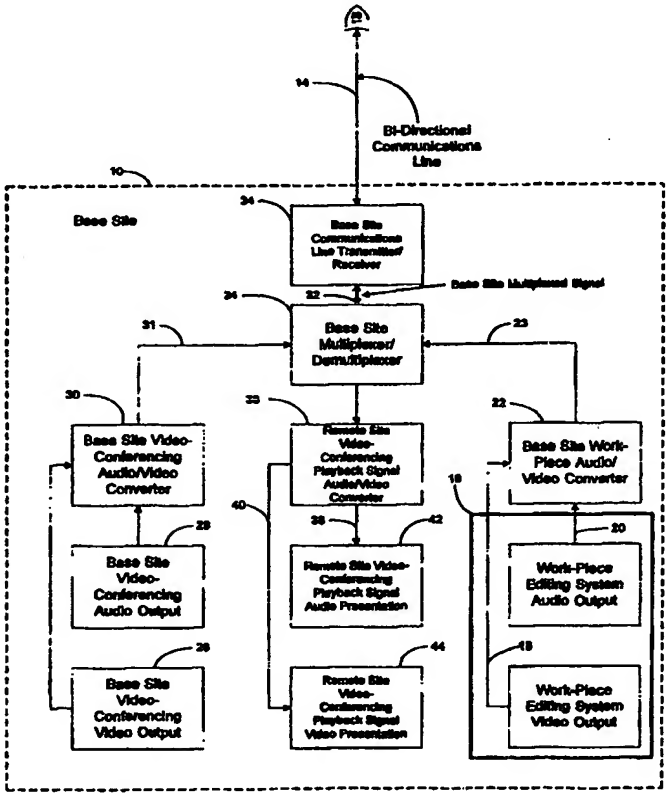
(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: VIDEO–CONFERENCING SYSTEM WITH VIDEO EDITING

(57) Abstract

The present invention relates to a system allowing people at two or more different locations to simultaneously collaborate on the editing of multimedia works. The system of the present invention includes a base site (10), having a multimedia editing system (16) and a video–conferencing system (26, 28, 30), and one or more remote sites (36), each having a multimedia presentation system and a video–conferencing system. The base site and the remote sites are coupled via one or more communications link (14). A multimedia work to be edited is stored at the base site and simultaneously presented at the base site and at the remote sites. Editing session participants at the base site and at the remote sites are able to communicate in real time via the video–conferencing system. The editing session participants collaboratively edit work by instructing those participants at the base site to make edits at the base site.



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VIDEO-CONFERENCING SYSTEM WITH VIDEO EDITING

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BACKGROUND OF THE INVENTION

The present invention relates to a system and method for editing multimedia works. More particularly, the present invention relates to a system and method for allowing people at two or more different locations to simultaneously collaborate on the editing of multimedia works.

In the production of a multimedia work, such as a motion picture or television program, the editing of the work is a critical step. In general, the editing process is accomplished by a group of people, often including the producers, directors, and editors of the project, working together in the same place at the same time. However, in the production of multimedia works it is often difficult to coordinate the schedules of all necessary parties to an editing session such that all editing-session participants can be in the same physical location at the same time in order to assist in the editing process.

The need for all parties to be in the same place during an editing session is due primarily to the collaborative nature of the editing process. The ability of the editor and director to see

each other during an editing session is important because of their need to observe each other's reactions, facial expressions, body language, etc.

If the editing system is capable of using high-quality media, such as production-quality video, the edits that are performed using the system will not need to be repeated before public release of the edited work. If the editing system performs the edits on a lower-than-production-quality medium, the edits will need to be repeated on the actual medium to be released publicly.

Since high-quality editing equipment is expensive, difficult to maintain, and requires specialized training and skill to operate, it is uneconomical, impractical, and inconvenient for a project to use multiple editing systems located at more than one location. A portable editing system would require the editors to work with a copy of the multimedia work; this creates problems in that there may be several copies of the work, each having been edited separately. At some time prior to public release, the different versions must be reconciled into a single version. This reconciliation is time-consuming, inconvenient, and expensive.

An editing session may require any number of producers, directors, editors, technical personnel, and others, thus incurring significant cost and inconvenience in arranging for them to all be in the same place at the same time. It is not uncommon, for example, for a director to be 'on-location' in a remote area working on a new project when the director's last project becomes ready to be edited in a studio elsewhere.

Previously, the editing of a director's last project would be delayed until the director could come to the editing studio; alternatively, the director would be forced to delegate responsibility for editing the project to those people who could be present at the editing studio.

U.S. Pat. No. 5,365,579 discloses a technique for remote collaboration on motion picture soundtracks wherein two copies of a motion picture video are played simultaneously, one at a

sending studio and one at a receiving studio, while a single soundtrack is played at the sending studio and transmitted to the receiving studio along with synchronization signals. The synchronization signals allow the receiving studio to synchronize the soundtrack with the film.

The system disclosed in the aforementioned patent provides limited advantages and falls short in many respects. First, such a system requires that the remote studio have a copy of the movie to be edited as well as the necessary equipment to play the movie and synchronize it with the soundtrack sent from the base site. Furthermore, such a system only allows for the editing of soundtracks and does not address the need to remotely edit the film portion of a motion picture. The system further fails to provide any means by which the director and editors can see and hear each other during the editing process.

Thus, there is a need for a system that allows remote collaboration on multimedia works and allows for a single copy of each of the audio and the video portions of the work to be transmitted from a base site to one or more remote sites for presentation to remotely-located editing session participants.

BRIEF SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to solve the problems described above with existing editing systems.

It is another object of this invention to allow for collaboration on the editing of films and television programs by people in remote locations.

It is another object of this invention to alleviate the need for more than one editing system during the post-production of multimedia works.

It is another object of this invention to reduce the delays associated with editing a multimedia work when the work's producer, director, or other necessary party to the editing process is located apart from the editing system.

It is another object of this invention to alleviate the need to coordinate multiple people's schedules in order to have them at the same location at the same time to collaboratively edit a multimedia work.

It is another object of this invention to transmit both video and audio information from a base site to one or more remote sites at a quality sufficient to allow producers, directors, editors, and others to make post-production edits.

It is another object of this invention to transmit without loss video and audio information corresponding to a multimedia work to be edited from a base site to a remote site while simultaneously transmitting without loss video and audio information corresponding to a video-conferencing session between the base and remote sites.

The above and other objects are achieved by a system and related method comprising remote collaboration among individuals working in different locations on a single motion picture, television program, or other multimedia work. The system includes a subsystem for transmitting high-quality or "production-quality" video signals, along with synchronized audio signals, from an editing studio to one or more remote locations. The editing studio and the remote locations are interconnected via a conferencing system to allow for real-time communication and collaboration among the various people involved in the editing session, regardless of their physical location. Such a conferencing system may be a video-conferencing system and thus include video of the participants.

If a multimedia work to be edited is in film format, such as a motion picture film with accompanying audio tracks, the work is first converted from film to digital video signals through the telecine process or another process for converting film to video information. The resulting video information is then loaded into an electronic editing system, preferably having digital signal outputs, such as an AVID Media Composer-brand non-linear editor, available from Avid Technology, Inc., Tewksbury, MA. If the output of the electronic editing system is not in digital form, the output is converted to digital form with an analog to digital converter. The editing system digital output signal (or the editing system output which has been converted to digital form) is then transmitted across a communications link to each of the remote sites.

At each of the remote sites, the digital signal is received and the video portion is converted into a format that can be presented on a video monitor. The audio portion of the transmitted signal is converted and presented through speakers at each of the remote sites.

The editing studio and all of the remote sites are interconnected via a conferencing system. The conferencing system allows participants at each of the locations to speak to and hear and, preferably, to see and be seen by, all of the other participants in the editing session in real-time or near real-time. Thus, as the work to be edited is presented at each of the remote sites as well as at the editing studio, the editing session participants can discuss the work and instruct the personnel at the editing studio to make edits to the work using the editing system.

If the editing system is a non-linear digital editing system, such as an AVID-brand editing system, the just-edited work can be played for all participants immediately after the most-recent edits have been made.

Additionally, the system may include a video mail system. A typical video mail system, such as Creative Partner software, available from E-motion Inc., Palo Alto, CA, running on IBM

compatible computers at the editing studio and at the remote sites and connected via a communications link, allows a producer, director, or others to view selected parts of the multimedia work and to make annotations to the multimedia work, with the annotations subsequently relayed to the other users of the system. An editor at the base site may then act on the annotations of the producer by editing the work on the editing system located at the base site.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated in the figures of the accompanying drawings which are meant to be exemplary and not limiting, in which like references refer to like or corresponding parts, and in which:

Figs. 1A and 1B contain block diagrams showing a remote collaboration system of one preferred embodiment of the present invention;

Figs. 2A and 2B contain block diagrams showing the system of Fig. 1A-1B in greater detail; and

Fig. 3 is a flow chart showing the operation of the system of Figs. 1A, 1B, 2A, and 2B in accordance with one preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to Figs. 1A and 1B, one preferred embodiment of the invention includes a base site 10 (shown in Fig. 1A), one or more remote sites 12 (one of which is shown in Fig. 1B) and a bi-directional communications link 14 connecting the base site to each remote site. The bi-directional communications link 14 is preferably lossless. In accordance with the invention, a motion picture editing professional is situated at the base site 10, and a motion picture director is located at one of the remote sites 12. The editing professional and director can collaborate on the editing of the motion picture film through use of the system, as described below.

At the base site (Fig. 1A), a motion picture work-piece to be edited is stored in an editing system 16. In preferred embodiments, the editing system is a digital, non-linear system. The non-digital motion-picture film which is the source of the work-piece is converted to digital form using a telecine process or other process known to those of skill in the art for converting motion picture film information into video signal information. The video signal information is digitized and the resulting digital representation of the source material is loaded into the digital editing system 16 and used as the work-piece.

The editing system 16 has video output 18 and audio output 20 which are coupled to a base site work-piece audio/video converter 22. The base site work-piece audio/video converter 22 combines the video and audio signals from the editing system 16 and converts them into a format compatible with a base site multiplexer/demultiplexer 24. The base site work-piece audio/video converter 22 has its output 23 coupled to the base site multiplexer/demultiplexer 24.

At the base site 10 there is a video-conferencing video camera having a video signal output 26. The base site video-conferencing video camera is focused on one, some, or all of the editing professionals located at the base site 10. The base site 10 has one or more microphones for capturing the audio portion of the video-conferencing session and producing an audio signal output 28.

The output signals of the base site video camera 26 and the output signals of the base site microphone(s) 28 are coupled to a base site video-conferencing audio/video converter 30. The base site video-conferencing audio/video converter 30 combines the base site video-conferencing video signals 26 with the base site video-conferencing audio signals 28 and converts them into a format compatible with the base site multiplexer/demultiplexer 24. The base site video-

conferencing audio/video converter's output 31 is coupled to the base site multiplexer/demultiplexer 24.

The base site multiplexer/demultiplexer 24 multiplexes the signals from the base site video-conferencing audio/video converter 30 with the signals from the base site work-piece audio/video converter 22. The base site multiplexed signal 32 is coupled to a base site communications line transmitter/receiver 34. The base site communications line transmitter/receiver 34 transmits the base site multiplexed signal 32 via the bi-directional communications line 14 to one or more remote sites 12.

The base site communications line transmitter/receiver 34 also receives a video-conferencing signal 86 which is generated at the remote site 12 and which is transmitted from the remote site 12 to the base site 10 via the bi-directional communications link 14. The remote site video-conferencing signal 86 is sent from the base site communications line transmitter/receiver 34 to the base site multiplexer/demultiplexer 24. The base site multiplexer/demultiplexer 24 couples the remote site video-conferencing signal to the base site video-conferencing playback signal audio/video converter 36.

The base site video-conferencing playback signal audio/video converter 36 separates the audio portion of the remote site video-conferencing playback signal 38 from the video portion of the remote site video-conferencing playback signal 40. The audio portion of the remote site video conferencing playback signal 38 is coupled to speakers, headphones, or other devices for generating an audio output 42 such that the remote site video-conferencing playback signal may be heard by the editing professionals located at the base site 10. The video portion of the remote site video-conferencing playback signal 40 is presented on a television, video monitor, video

projector, or other device for generating a video output 44 which can be seen by some or all of those editing session participants located at the base site 10.

At each of the one or more remote sites 12 (Fig. 1B), there is a communications line transmitter/receiver 50 that is coupled to the bi-directional communications line 14. The remote site communications line transmitter/receiver 50 receives the multiplexed signal from the base site 10 and converts it into a form compatible with the remote site multiplexer/demultiplexer 52.

The converted multiplexed signal 54 is sent from the remote site communications line transmitter/receiver 50 to the remote site multiplexer/demultiplexer 52. The remote site multiplexer/demultiplexer 52 demultiplexes the signal from the remote site communications line transmitter/receiver 50 into a base site video-conferencing playback signal 56 and a work-piece playback signal 58.

The base site video-conferencing playback signal 56 is coupled to a remote site video-conferencing playback converter 60. The remote site video-conferencing playback converter 60 separates the audio portion of the base site video-conferencing playback signal 62 from the video portion of the base site video-conferencing playback signal 64. The audio portion of the base site video-conferencing playback signal 62 is coupled to speakers, headphones, or other devices for genthating an audio output 66 such that the base site video-conferencing playback signal may be heard by the director or other editing session participants located at the remote site 12. The video portion of the base site video-conferencing playback signal 64 is presented on a television, video monitor, video projector, or other device for generating a video output 68 which can be seen by the director and other editing session participants located at the remote site 12.

The work-piece playback signal 58 is demultiplexed from other signals at the remote site by the remote site multiplexer/demultiplexer 52 and coupled to a remote site work-piece

audio/video converter 70. The remote site work-piece audio/video converter 70 separates the audio portion of the work-piece signal 72 from the video portion of the work-piece signal 74. The remote site work-piece audio/video converter 70 may also convert the audio and/or video remote site work-piece signals 72, 74 into signals of different standards, as required by the specific playback equipment employed.

The work-piece audio signals 72 are coupled to audio speakers, headphones, or other devices for generating an audio output 76 such that the work-piece audio signals can be heard by the director or other editing session participants located at the remote site 12.

The work-piece video signals 74 are presented on a television, video monitor, video projector, or other devices for generating video output 78 which can be seen by the director or other editing session participants located at the remote site 12.

At each of the remote sites 12 there is a remote site video-conferencing video camera having a video signal output 80. The remote site video-conferencing video camera is focused on one, some, or all of the editing professionals located at the remote site 12. The remote site 12 also has one or more microphones or other devices for capturing the audio portion of the video-conferencing session and providing an audio signal output 82.

The output signals of the remote site video-conferencing video camera 80 and the output signals of the remote site video-conferencing microphone(s) 82 are coupled to a remote site video-conferencing audio/video converter 84. The remote site video-conferencing audio/video converter 84 combines the remote site video-conferencing video signals 80 with the remote site video-conferencing audio signals 82 and converts them into a format compatible with the remote site multiplexer/demultiplexer 52.

The remote site multiplexer/demultiplexer 52 is coupled to the remote site video-conferencing audio/video converter 84 and converts the signals from the remote site video-conferencing audio/video converter 84 as necessary so that the signals will be compatible with the remote site communications line transmitter/receiver 50. The remote site multiplexer/demultiplexer 52 is coupled to the remote site communications line transmitter/receiver 50. The remote site communications line transmitter/receiver 50 transmits the remote site video-conferencing signal 86 across the bi-directional communications line 14 to the base site 10.

With reference to Figs. 2A and 2B, another preferred embodiment of the invention includes a base site 110 (shown in Fig. 2A) and a remote site 112 (shown in Fig. 2B). Coupling the base site 110 and the remote site 112 is up to eighty kilometers of single mode optical fiber 114 and an ISDN communications link 116. Other types of communications links may be used, including satellite and microwave transmissions and coaxial cable connections, such as BELDEN 8281 coaxial cable, available from Belden Inc., St. Louis, MO, with accompanying transmitters and receivers as would be used by those of skill in the art.

At the base site 110 (Fig. 2A), a motion picture work-piece to be edited is stored in a digital, non-linear editing system 118 such as the AVID Media Composer editing system running on a Power Macintosh computer. The editing system 118 has: analog audio outputs 120, 121 coupled to audio speakers 122, 124; a D1-standard digital audio/video output 126, conforming to the CCIR 601/SMPTE 259M (D1) serial digital data standard for broadcast-quality television signals, coupled to a base site multiplexer/demultiplexer 128 capable of wave-length division multiplexing multiple input signals and transporting 270 million bits per second of 4:2:2 encoded (D1) video and optionally embedding up to four AES/EBU digital audio

channels, two RS-422 machine control channels, longitudinal time code, and a channel of talk-back audio into the 270 million bits per second data stream; an Ethernet coupling 130 to a base site Ethernet hub 132; and a video output 134 coupled to a base site broadcast-quality, SMPTE-calibrated editing system monitor 136. Through wave-length division multiplexing, a unique transmission frequency is assigned to each data channel. The channels are then optically multiplexed such that the multiple channels travel through the optical fiber simultaneously and with negligible interference.

Coupled to the base site Ethernet hub 132 is an IBM-compatible computer 138 running Emotion's Creative Partner software, a personal-computer-based multimedia collaboration program, allowing for remote, asynchronous collaboration on multimedia works. The Creative Partner system is client/server software which allows for management and annotation of multimedia content in a distributed architecture.

The base site Ethernet hub 132 is coupled to a MAX wide area network access switch 140, available from Ascend Communications, Inc., Alameda, CA. The switch 140 is coupled to the remote site 112 via the ISDN communications link 116. Alternately, the base site Ethernet hub 132 may be coupled directly to the communications link 112.

At the base site there is a video-conferencing video camera 144 having an NTSC video output 152 coupled to a base site video-conferencing audio/video converter 146 that converts NTSC video signals to serial digital data conforming to CCIR 601/SMPTE 259M (D1). Also coupled to the base site video-conferencing audio/video converter 146 is a base site video-conferencing microphone 148. The base site video-conferencing microphone has a cardoid pickup pattern to minimize feedback through the talk-back channel. The base site video-conferencing audio/video converter 146 digitizes the audio output 150 from the base site video-

conferencing microphone 148 and the NTSC video signal output 152 from the base site video-conferencing video camera 144 and combines them into one D1-standard digital base site video-conferencing signal 154. The D1-standard digital base site video-conferencing signal 154 is coupled to the base site multiplexer/demultiplexer 128.

The base site multiplexer/demultiplexer 128 wave-length division multiplexes the D1-standard digital base site video-conferencing signal 154 and the D1-standard digital work-piece signal 126. The video-conferencing signal 154 and the digital work-piece signal 126 are thus capable of being transmitted substantially simultaneously over the optical fiber communications link 114 at a rate of 270 million bits per second. The multiplexed output 156 of the base site multiplexer/demultiplexer 128 is coupled to a base site optical fiber transmitter/receiver 158. The base site optical fiber transmitter/receiver operates at a wavelength of 1310 or 1550 nanometers; supplies a launched power of -3dBm ± 1db, typically; has a received sensitivity of -34dBm, typically; and has a maximum input level for a bit error rate of 1×10^{-9} of -1dBm. The base site optical fiber transmitter/receiver 158 transmits optical signals onto, and detects optical signals received on, the optical fiber 114 between the base site 110 and the remote site 112.

The remote site 112 has a video-conferencing video camera 200 having an NTSC video output 202 coupled to a remote site video-conferencing audio/video converter 204 that converts NTSC video signals to serial digital data conforming to CCIR 601/SMPTE 259M (D1). Also coupled to the remote site video-conferencing audio/video converter 202 is a remote site video-conferencing microphone 206 having an audio signal output 207. The remote site video-conferencing microphone has a cardoid pickup pattern to minimize feedback through the talk-back channel. The remote site video-conferencing audio/video converter 204 digitizes the audio output 208 of the remote site video-conferencing microphone 206 and the NTSC video signal

202 from the remote site video-conferencing video camera 200 and combines them into one D1-standard digital remote site video-conferencing signal 210. The D1-standard digital remote site video-conferencing signal 210 is coupled to a remote site multiplexer/demultiplexer 212 capable of wave-length division multiplexing multiple signals and transporting 270 million bits per second of 4:2:2 encoded (D1) video and optionally embedding up to four AES/EBU digital audio channels, two RS-422 machine control channels, longitudinal time code, and a channel of talkback audio into the 270 million bits per second data stream. The remote site multiplexer/demultiplexer 212 is coupled to the remote site optical fiber transmitter/receiver 214. The remote site optical fiber transmitter/receiver 214 operates at a wavelength of 1310 or 1550 nanometers; supplies a launched power of -3dBm ± 1db, typically; has a received sensitivity of -34dBm, typically; and has a maximum input level for a bit error rate of 1×10^{-9} of -1dBm. The remote site optical fiber transmitter/receiver 214 is coupled to the optical fiber communications link 114 which couples the base site 110 and the remote site 112.

At the remote site 112, the base site multiplexed signal is received by the remote site optical fiber transmitter/receiver 214 and coupled to the remote site multiplexer/demultiplexer 212. The remote site multiplexer/demultiplexer 212 demultiplexes the base site work-piece signal 216 from the base site video-conferencing signal 218. The base site work-piece signal 216 is coupled to the remote site work-piece audio/video converter 220.

The remote site work-piece audio/video converter 220 separates the base site work-piece audio signals 222 from the base site work-piece video signal 226. The remote site work-piece audio/video converter 220 converts the base site work-piece audio signals 222 from a D1-standard digital signal into an analog signal compatible with audio speakers 228, 230. At the same time, the remote site work-piece audio/video converter 220 converts the base site work-

piece video signal from a D1-standard digital signal into an analog signal 226 compatible with an analog-component-input, broadcast-quality, SMPTE-calibrated monitor 232. The converted work-piece audio 222 from the output of the remote site work-piece audio/video converter 220 is coupled to speakers 228, 230 at the remote site. The converted work-piece video 226 from the output of the remote site work-piece audio/video converter 220 is coupled to the component-level input of the monitor 232.

At the base site 110, the remote site video-conferencing signal is received by the base site optical fiber transmitter/receiver 158 via the optical fiber 114. The remote site video-conferencing signal 166 is coupled to a base site video-conferencing audio/video converter 160. The base site video-conferencing audio/video converter 160 separates the remote site video-conferencing audio signal 162 from the remote site video-conferencing video signal 164. The base site video-conferencing audio/video converter 160 converts the remote site video-conferencing audio signal from a D1-standard digital signal into an analog signal 162 compatible with audio speaker 163. The base site video-conferencing audio/video converter 160 converts the remote site video-conferencing video signal from a D1-standard digital signal into an analog signal 164 compatible with an NTSC-standard video monitor 168. The converted video-conferencing audio output 162 of the base site video-conferencing audio/video converter 160 is coupled to one or more speakers 163 at the base site 110. The converted video-conferencing video output 164 of the base site video-conferencing audio/video converter 160 is coupled to the NTSC-standard video monitor 168.

At the remote site 112, the base site video-conferencing signal is received by the remote site optical fiber transmitter/receiver 214 via the optical fiber 114. The base site video-conferencing signal 218 is coupled to a remote site video-conferencing audio/video

converter 234. The remote site video-conferencing audio/video converter 234 separates the base site video-conferencing audio signal 236 from the base site video-conferencing video signal 238. The remote site video-conferencing audio/video converter 234 converts the base site video-conferencing audio signal from a D1-standard digital signal into an analog signal 236 compatible with audio speaker 242. The remote site video-conferencing audio/video converter 234 converts the base site video-conferencing video signal from a D1-standard digital signal into an analog signal 238 compatible with an NTSC-standard video monitor 240. The converted video-conferencing audio output 236 of the remote site video-conferencing audio/video converter 234 is coupled to one or more speakers 242 at the remote site 112. The converted video-conferencing video output 238 of the remote site video-conferencing audio/video converter 234 is coupled to an NTSC-standard video monitor 240.

At the remote site 112 there is an IBM compatible computer 246 running Creative Partner client software. The IBM compatible computer 246 is coupled to an ASCEND Pipeline Ethernet-to-ISDN bridge/router 248. The ASCEND Pipeline Ethernet-to-ISDN bridge/router 248 is coupled to the ISDN communications link 116, thereby providing a communications link between the IBM-compatible computer 138 at the base site 110 running E-motion's Creative Partner server software and the IBM-compatible computer 246 at the remote site 112 running E-motion's Creative Partner client software. In addition, the computer 246 receives the editing system user interface during an editing session so that the director can watch the settings being changed by the editor as the editor makes changes.

Fig. 3 is a flow chart showing the course of an editing session of a preferred embodiment of the remote editing system of the present invention. An editor at the base site initiates a local editing session, step 300, by reviewing the video mail system for editing instructions left on the

system since the last editing session, step 302. If there are no unperformed edits entered into the video mail system, the editor ends the editing session, step 306.

If there are unperformed editing instructions entered in the video mail system, step 308, the editor determines whether the edits to be performed will require collaboration with editing session participants located remotely, step 310. If the edits to be performed do not require collaboration with remotely-located editing session participants, step 312, the base-site-located editor edits the work-piece on the base site editing system per the instructions of other editing session participants that have been conveyed to the editor via the video mail system, step 314. Having completed a given edit, the base-site-located editor continues to review the video mail system for unperformed edits, step 302, possibly repeating the process, steps 302, 304, 306, 308, 310, 316, 312, 314. The editor may then initiate a remote editing session to discuss the editing changes with the director, step 318, or may transmit the edited work-piece to the director for off-line viewing.

If the editor determines that the edit to be performed as described in the video mail system needs to be done collaboratively with people located at a remote site, step 316, the base-site-located editor initiates a remote editing session, step 318. The work-piece is presented simultaneously at the base site and at the one or more remote sites, step 320. As the work-piece is presented, the editing session participants discuss the work-piece and editing suggestions via the video-conferencing system, step 322. If the editing session participants decide to continue the editing session, step 324, they can then make editing decisions, step 326, about edits to be performed by the editor at the base site using the base site editing system, step 328. The editor makes the edits while the others can monitor the nature of the edits by observing the graphical user interface screen that the editor uses to make the edits. After the edits are completed, the

newly edited work-piece is replayed for the editing session participants to review the edits, step 330. At this stage, the editing session participants continue to discuss the work-piece via the video-conferencing system, step 322.

If the editing session participants decide not to continue with the real-time, on-line editing session, step 332, they then determine whether they want to commence an off-line editing session, step 334. If they do not want to continue an off-line editing session, the editing session ends, step 336. If they decide to continue with an off-line editing session, step 337, the director and remaining editing session participants use the video mail system to annotate the work-piece and include editing instructions to be performed by the base-site-located editor, step 338. Once the instructions have been entered into the video mail system, the editing session participants can continue to edit off-line, step 337, or decide to end the session, step 336. Concurrently with or subsequent to the entering of the instructions into the video mail system, step 338, the video mail system sends the entered instructions to the base site, step 340.

Alternately, editing session participants may decide to initiate an off-line editing session by beginning with step 338, or decide to initiate a remote editing session by beginning with step 318.

As a result, a director and editor may collaborate on the editing of a motion picture despite being separated by a great distance and despite the fact that there is only one editing system. The simultaneous transmission of production-quality motion picture video and audio and very high-quality video-conferencing signals allow the two to work closely together on a final product and closely observe each other's reactions without the constraints of the typical, low-quality video conferencing system in which participants must restrain their motion to prevent blurring of the image.

While the invention has been described and illustrated in connection with preferred embodiments, many variations and modifications as will be evident to those skilled in this art may be made without departing from the spirit and scope of the invention, and the invention is thus not to be limited to the precise details of methodology or construction set forth above as such variations and modification are intended to be included within the scope of the invention.

WHAT IS CLAIMED IS:

1. A system for allowing collaborative editing of entertainment media between a first site and a second site, the first site and second site connected via one or more communications links, the system comprising:

a multimedia editing system located at the first site for generating an information signal comprising at least a video portion of the entertainment media;

a conferencing system generating conferencing signals at the first site and second site; and

a transmission system for substantially simultaneously transmitting the information signal from the first site to the second site and the conferencing signals between the first site and the second site via the one or more communications links.

2. The system of claim 1, wherein the first site and second site are connected via a single communications link and the information signal and the conferencing signals are transmitted between the first and second sites via the single communications link.

3. The system of claim 1, wherein at least one of the one or more communications links comprises a fiber optic cable.

4. The system of claim 1, wherein at least one of the one or more communications links comprises a single-mode fiber optic cable.

5. The system of claim 1, wherein at least one of the one or more communications links comprises a channel capable of transporting D1-standard signals.

6. The system of claim 1, wherein at least one of the one or more communications links comprises a channel capable of transporting digital signals at a rate of at least approximately 270 million bits per second.

7. The system of claim 1, wherein at least one of the one or more communications links comprises a channel capable of transporting D1-standard digital signals at a rate of at least approximately 270 million bits per second.

8. The system of claim 1, wherein at least one of the one or more communications links comprises a channel capable of transporting signals for a distance of at least approximately 80 kilometers.

9. The system of claim 1, wherein at least one of the one or more communications links comprises a channel capable of transporting D1-standard digital signals for a distance of at least approximately 80 kilometers.

10. The system of claim 1, wherein the multimedia editing system is a non-linear multimedia editing system.

11. The system of claim 1, wherein the multimedia editing system is an AVID-brand non-linear editing system.

12. The system of claim 1, wherein the information signal is a digital signal.

13. The system of claim 1, wherein the information signal is a D1-standard digital signal.

14. The system of claim 1, wherein the conferencing signals comprise an audio portion.

15. The system of claim 1, wherein the conferencing signals comprise a video portion.

16. The system of claim 1, wherein the conferencing signals comprise an audio portion and a video portion.

17. The system of claim 1, wherein the information signal and the conferencing signals are wavelength division multiplexed prior to transmission and demultiplexed after transmission.

18. A system for allowing collaborative editing of entertainment media between a base site and a plurality of remote sites, the base site and remote sites connected via a plurality of communications links, the system comprising:

a multimedia editing system located at the base site for generating an information signal comprising at least a video portion of the entertainment media;

a conferencing system generating conferencing signals at the base site and remote sites; and

a transmission system for substantially simultaneously transmitting the information signal from the base site to the remote sites and the conferencing signals between the base site and the remote sites via the plurality of communications links.

19. A method for collaboratively editing entertainment media between a first site and a second site, the first site and second site connected via one or more communications links, the method comprising the steps of:

generating an information signal comprising at least a video portion of the entertainment media at the first site;

generating conferencing signals at the first site and at the second site;

substantially simultaneously transmitting the information signal from the first site to the second site and the conferencing signals between the first site and the second site via the one or more communications links.

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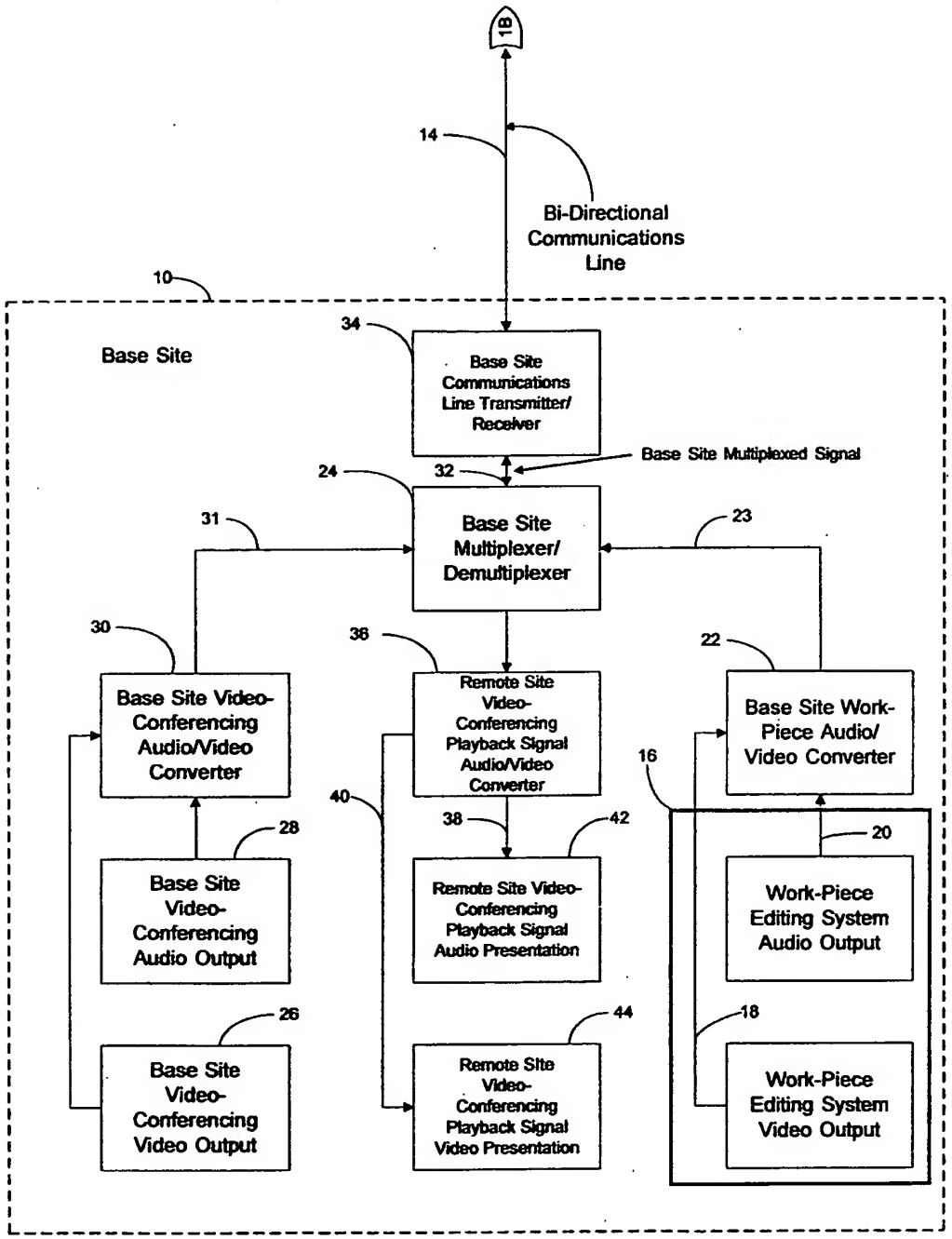

Fig. 1A

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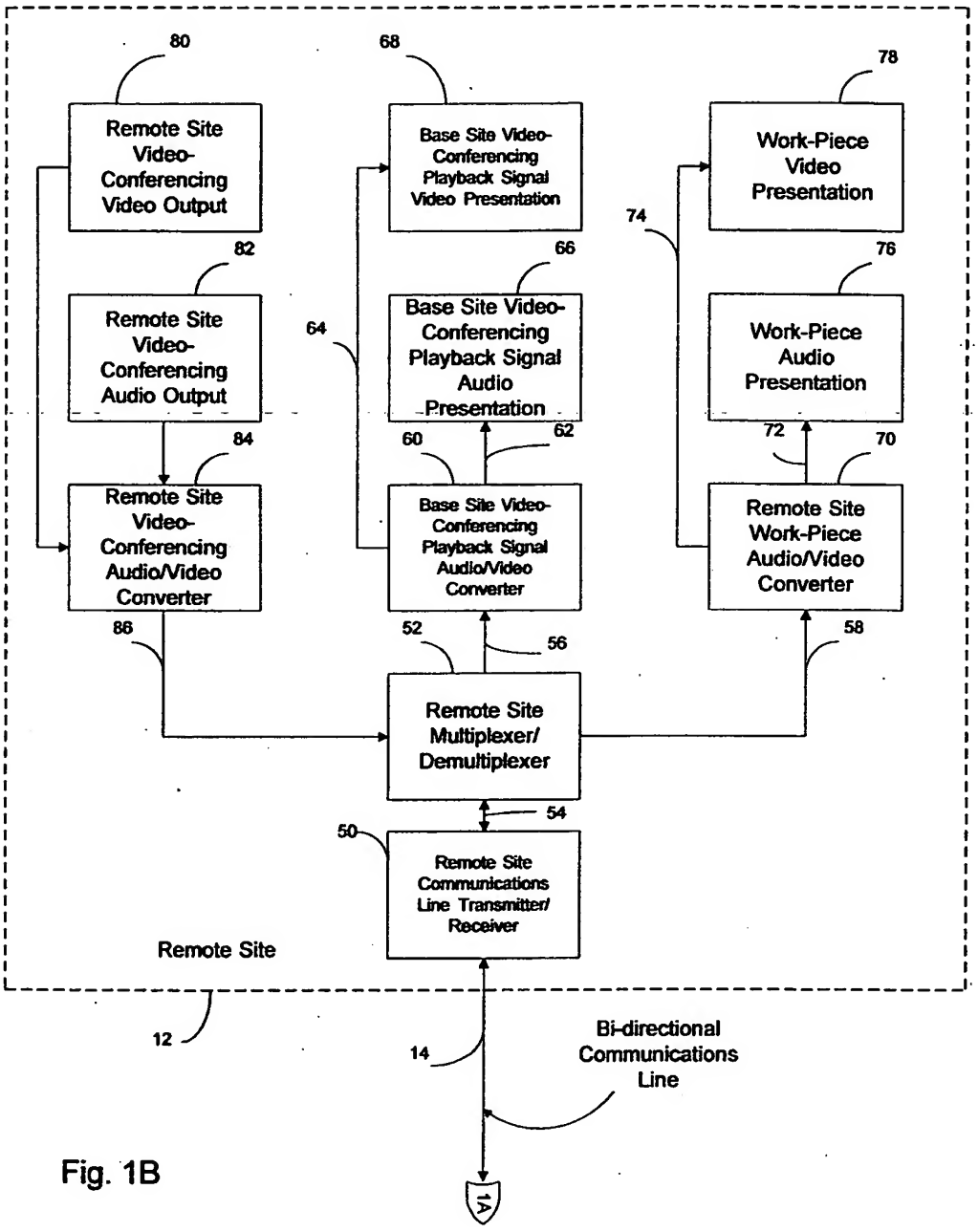

Fig. 1B

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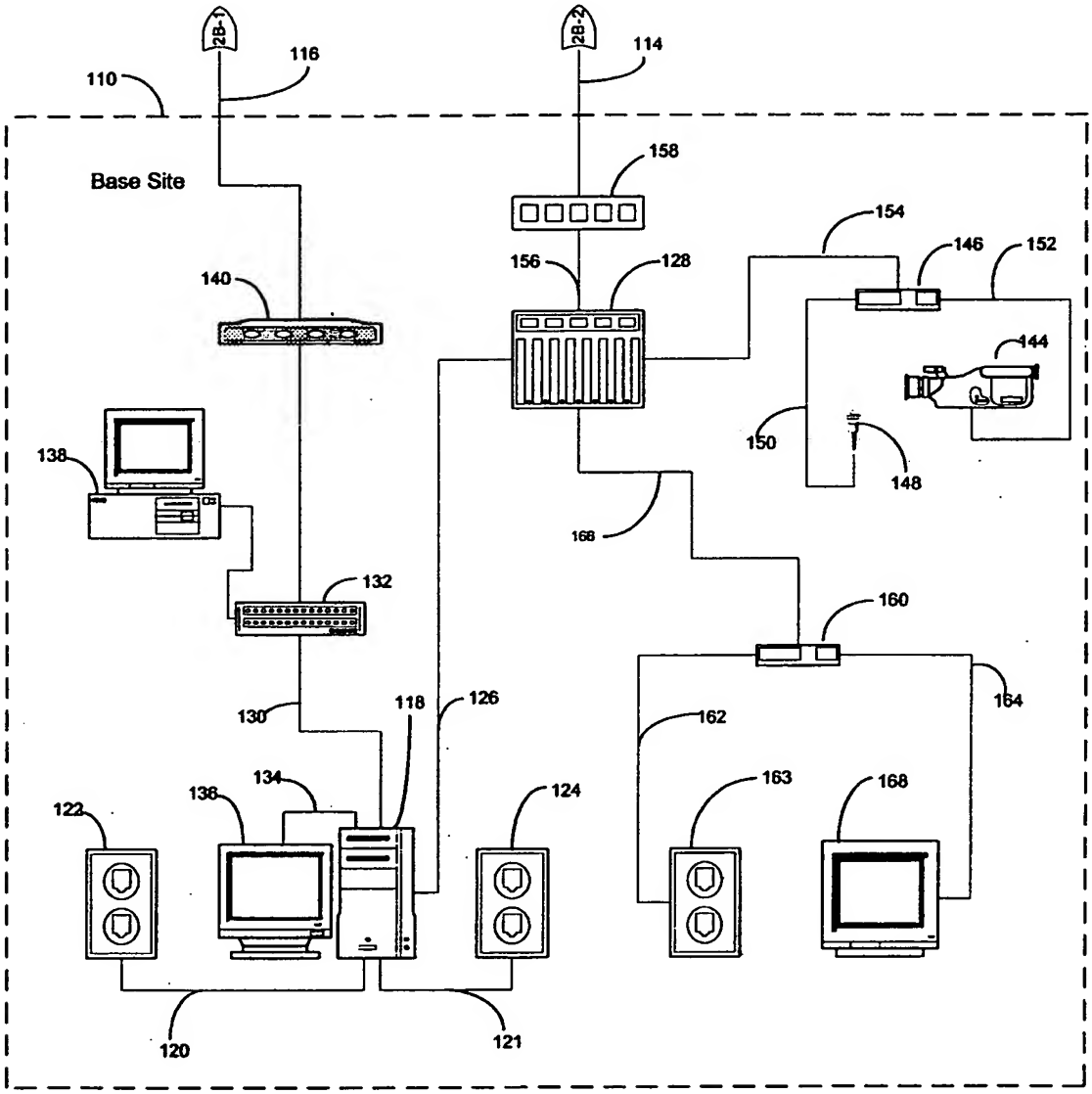

Fig. 2A

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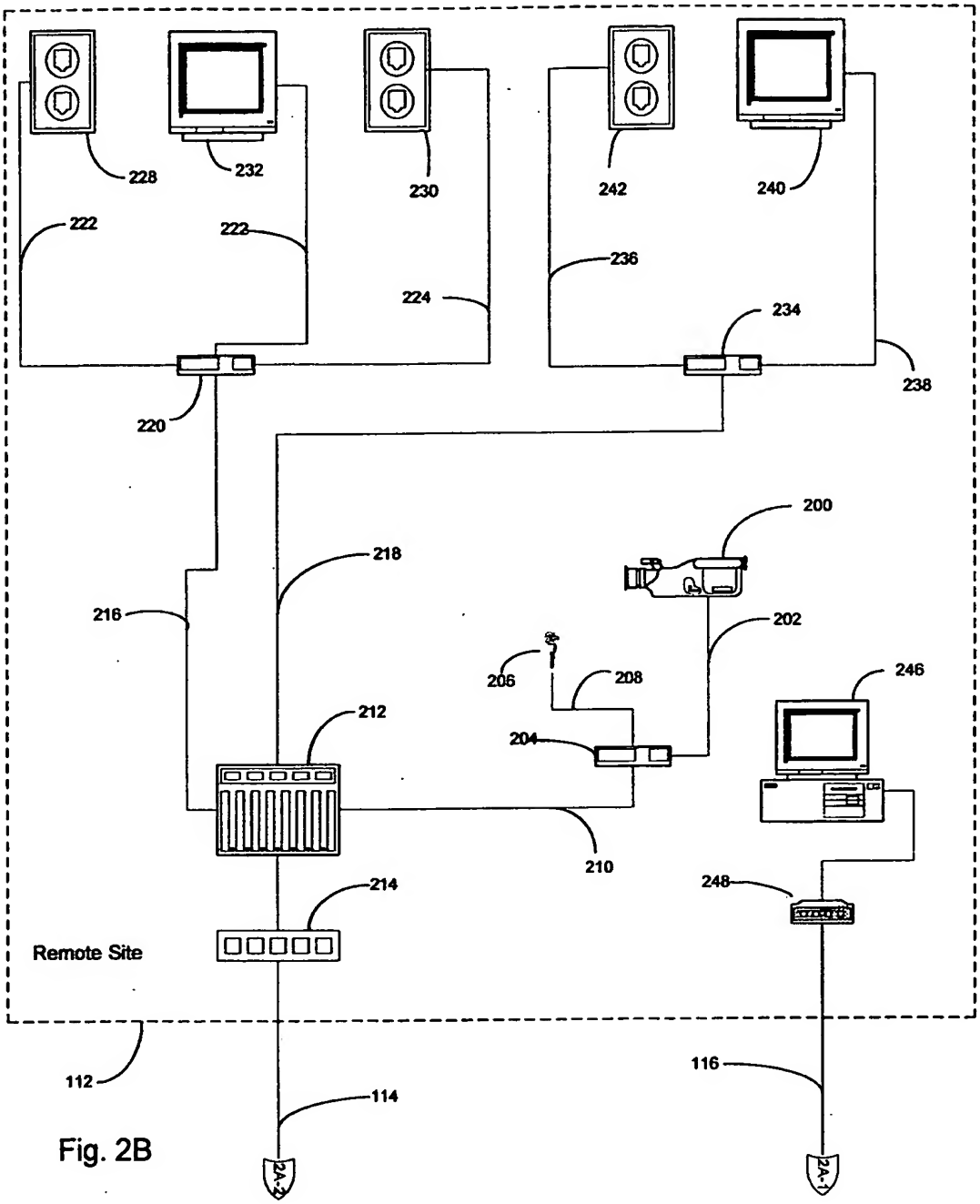

Fig. 2B

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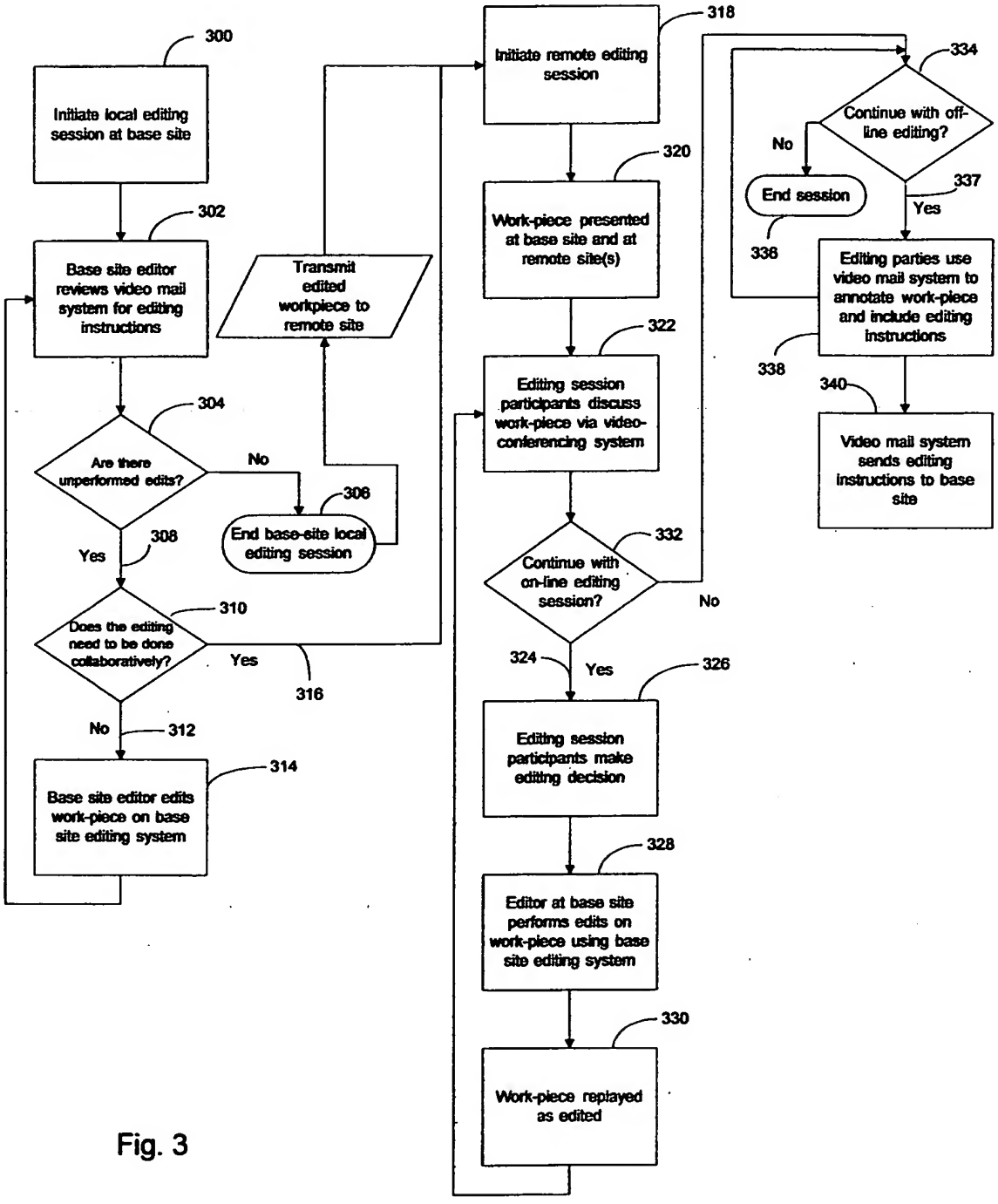

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/10414

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 7/15
US CL :348/328

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 348/328, 348/13-20, H04N 7/14, 7/15

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 5,617,539 A (LUDWIG et al.) 01 April 1997 col. 3, lines 5-27, col. 9, lines 28-53, col. 18, line 37- col. 19, line 30 and col. 26, line 34 - col. 29, line 39.	1-2,5-19 ---------- 3, 4
Y	US 4,530,084 A (STREBEL et al.) 16 July 1985 columns 1 and 5.	3,4
X, P	US 5,767,897 A (HOWELL) 16 June 1998 whole document	1-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 05 JULY 1999	Date of mailing of the international search report 27 August 1999
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer CHRISTOPHER GRANT Joni Hill Telephone No. (703) 305-4755

Form PCT/ISA/210 (second sheet)(July 1992)*